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Tuning of ionic transport through graphene oxide fibers by sheets size

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Abstract

In this study, graphene oxide fibers are introduced as new graphene oxide (GO) membranes with the capability of ion selectivity. Graphene oxide fibers, like other macro structured membranes, are always associated with cavities and defects. To solve this problem, a 50% combination of graphene oxide suspension including small sheets with an average size of $\sim 0.5 \mu\text{m}^2$ and large sheets with an area of more than $10 \mu\text{m}^2$ was used. According to the morphological results of scanning electron microscopy, as well as the amount of ionic transport through the fiber, reduction of cavities and its defects were confirmed. Moreover, it was found that ionic current through fibers consist of large and small GO sheets is more controllable. This leads to more ionic selectivity via tunable swelling. Finally, the scalability of graphene oxide fibers investigated and found that increasing number and length of the fibers increases the ionic current as linear trend.

Keywords: graphene oxide fibers, sheet size, ionic sieving, ion channels

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